What is claimed is:

1. An implantable device comprising a reticulated resiliently-compressible elastomeric matrix.

2. The implantable device of claim 1, wherein the implantable device is biodurable for at least 29 days.

3. The implantable device of claim 1, wherein the elastomeric matrix comprises a polycarbonate polyurethane.

4. The implantable device of claim 3, wherein the implantable device is biodurable for at least 6 months.

5. The implantable device of claim 1, comprising a reticulated elastomeric matrix comprising a plurality of pores, the pores having an average diameter or other largest transverse dimension of at least about 150 μm.

6. The implantable device of claim 3, wherein the pores have an average diameter or other largest transverse dimension of from greater than 250 μm to about 900 μm.

7. The implantable device of claim 1, comprising a reticulated elastomeric matrix comprising a plurality of pores, the pores having an average diameter or other largest transverse dimension of from about 275 μm to about 900 μm.

8. The implantable device of claim 1, comprising a reticulated elastomeric matrix comprising a plurality of pores, the pores having an average diameter or other largest transverse dimension of from about 275 μm to about 700 μm.

9. The implantable device of claim 1, comprising a resiliently-compressible elastomeric matrix such that the implantable device, when compressed from a relaxed configuration to a first, compact configuration for delivery via a delivery-device, expands to a second, working configuration, *in vitro*, at least about 80% of the size of the relaxed configuration in at least one dimension.

10. The implantable device of claim 9, wherein the recovery properties of the elastomeric matrix are such that a dimension of the second, working configuration is within about 20% of a relaxed dimension of the relaxed configuration after compression to from about 50 to about 10% of the relaxed dimension and wherein the elastomeric matrix has a compressive strength at 50% compression of from about 1 psi (about 700 kg/m^2) to about 200 psi (about 140,000 kg/m^2), a tensile strength of from about 1 psi (about 700 kg/m^2) to about 75 psi (about 52,500 kg/m^2) and an ultimate tensile elongation of at least about 150%.

11. The implantable device of claim 1, wherein the elastomeric matrix has a compression set after 22 hours compression at about 25°C to 25% of its thickness in one dimension of not more than about 30%.

12. The implantable device of claim 1, wherein the elastomeric matrix comprises polycarbonate, polyether, polysiloxane, polyurethane, hydrocarbon, or mixtures thereof.

13. The implantable device of claim 1, wherein the reticulated elastomeric matrix is configured to permit cellular ingrowth and proliferation into the elastomeric matrix.

14. A process for producing an elastomeric matrix comprising a polymeric material having a reticulated structure, the process comprising:

a) fabricating a mold having surfaces defining a microstructural configuration for the elastomeric matrix;

b) charging the mold with a flowable polymeric material;

c) solidifying the polymeric material; and

d) removing the mold to yield the elastomeric matrix.

15. The process of claim 14, wherein the mold is a sacrificial mold and is removed by melting, dissolving or subliming the sacrificial mold.

16. The process of claim 14, wherein the sacrificial mold comprises a plurality of particles interconnected one with another at multiple points on each particle, wherein the flowable polymeric material is contained within the interstices between the particles.

17. The process of claim 16, wherein the particles comprise a first material having a melting point at least 5°C lower than the softening temperature of the polymeric material that is contained within the interstices where, optionally, the first material comprises a hydrocarbon wax.

18. The process of claim 16, wherein the particles comprise an inorganic salt, a sugar, a starch, or mixtures thereof.

19. The process of claim 18, wherein the particles comprise starch and the starch is removed enzymatically.

20. The process of claim 18, wherein the polymeric material comprises a solvent-soluble thermoplastic elastomer, the flowable polymeric material comprises a solution of the thermoplastic elastomer in a solvent, and the solvent is evaporated to solidify the thermoplastic elastomer.

21. The process of claim 20, wherein the thermoplastic elastomer is selected from the group consisting of polycarbonate polyurethanes, polyether polyurethanes, polysiloxane polyurethanes, hydrocarbon polyurethanes, polyurethanes with mixed soft segments, and mixtures thereof.

22. A process for producing an elastomeric matrix having a reticulated structure, the process comprising:

a) coating a reticulated foam template with a flowable resistant material, optionally a thermoplastic polymer or a wax;

b) exposing a coated surface of the foam template;

c) removing the foam template to yield a casting of the reticulated foam template;

d) coating the casting with an elastomer in a flowable state to form an elastomeric matrix;

e) exposing a surface of the casting; and

f) removing the casting to yield a reticulated elastomeric matrix comprising the elastomer.

23. The process of claim 22, wherein the elastomer is a thermoplastic elastomer selected from the group consisting of polycarbonate polyurethanes, polyether polyurethanes, polysiloxane polyurethanes, hydrocarbon polyurethanes, polyurethanes with mixed soft segments, and mixtures thereof.

24. A lyophilization process for producing an elastomeric matrix having a reticulated structure, the process comprising:

a) forming a solution comprising a solvent-soluble biodurable elastomer in a solvent;

b) at least partially solidifying the solution to form a solid, optionally by cooling the solution; and

c) removing the non-polymeric material, optionally by subliming the solvent from the solid under reduced pressure, to provide an at least partially reticulated elastomeric matrix comprising the elastomer.

25. The process of claim 24, wherein the elastomer is a thermoplastic

elastomer selected from the group consisting of polycarbonate polyurethanes, polyether polyurethanes, polysiloxane polyurethanes, hydrocarbon polyurethanes, polyurethanes with mixed soft segments, and mixtures thereof.

26. A polymerization process for preparing a reticulated elastomeric matrix, the process comprising admixing:

a) a polyol component,

b) an isocyanate component,

c) a blowing agent,

d) optionally, a crosslinking agent,

e) optionally, a chain extender,

f) optionally, at least one catalyst,

g) optionally, a surfactant, and

h) optionally, a viscosity modifier;

to provide a crosslinked elastomeric matrix and reticulating the elastomeric matrix by a reticulation process to provide the reticulated elastomeric matrix.

27. The process of claim 26, wherein the polyol component is liquefied prior to admixing.

28. The process of claim 27, wherein a first admixture comprising the polyol and isocyanate components is formed by admixing the polyol component and the isocyanate component; a second admixture comprising the blowing agent and, optionally, the catalyst is formed by admixing the blowing agent and the optional catalyst; and the first admixture and the second admixture are admixed.

29. The process of claim 26, wherein the polyol component comprises a polycarbonate polyol, hydrocarbon polyol, polysiloxane polyol, poly(carbonate-co-hydrocarbon) polyol, poly(carbonate-co-siloxane) polyol, poly(hydrocarbon-co-siloxane)

polyol, or mixtures thereof.

30. The process of claim 29, wherein the polyol component comprises a difunctional polycarbonate diol.

31. The process of claim 30, wherein the difunctional polycarbonate diol is 1,6-hexamethylene polycarbonate diol.

32. The process of claim 26, wherein the isocyanate component comprises tetramethylene diisocyanate, cyclohexane-1,2-diisocyanate, cyclohexane-1,4-diisocyanate, hexamethylene diisocyanate, isophorone diisocyanate, methylene-bis-(p-cyclohexyl isocyanate), p-phenylene diisocyanate, 4,4'-diphenylmethane diisocyanate, 2,4'-diphenylmethane diisocyanate, 2,4-toluene diisocyanate, 2,6-toluene diisocyanate, m-tetramethylxylene diisocyanate, or mixtures thereof.

33. The process of claim 32, wherein the isocyanate component comprises MDI, wherein the MDI is a mixture of at least about 5% by weight of 2,4'-MDI with the balance 4,4'-MDI.

34. The process of claim 32, wherein the average number of isocyanate groups per molecule in the isocyanate component is about 2.

35. The process of claim 32, wherein the average number of isocyanate groups per molecule in the isocyanate component is greater than 2.

36. The process of claim 35, wherein the average number of isocyanate groups per molecule in the isocyanate component is greater than about 2.2.

37. The process of claim 32, wherein the isocyanate component has an isocyanate index and wherein the isocyanate index is from about 0.9 to 1.029.

38. The process of claim 37, wherein the isocyanate index is from about 0.98 to about 1.02.

39. The process of claim 37, wherein the isocyanate index is from about 0.9 to about 1.1.

40. The process of claim 26, wherein the blowing agent is water.

41. The process of claim 26, wherein a tertiary amine is present as a catalyst.

42. The process of claim 26, wherein a silicone-based surfactant is present as a surfactant.

43. The process of claim 26, wherein propylene carbonate is present as a viscosity modifier.

44. The process of claim 26, wherein the reticulation is by combustion reticulation.

45. The process of claim 44, wherein the combustible atmosphere comprises a mixture of hydrogen and oxygen.

46. A process for preparing a reticulated composite elastomeric implantable device, the process comprising endoporously coating a reticulated elastomeric matrix with a coating material selected to encourage cellular ingrowth and proliferation.

47. The process of claim 46, wherein the coating material comprises a foamed coating of a biodegradable material, the biodegradable material comprising collagen, fibronectin, elastin, hyaluronic acid or mixtures thereof.

48. A method of treating a vascular malformation, the method comprising:

a) compressing the implantable device of claim 1 from a relaxed configuration to a first, compact configuration;

b) delivering the compressed implantable device to the *in vivo* site of the vascular malformation via a delivery-device; and

c) allowing the implantable device to expand to a second, working configuration at the *in vivo* site.

49. The method of claim 48, wherein the implantable device comprises a plurality of elastomeric matrices.